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NASA-07511 (June 2004)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

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06/04

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SECTION 07511

BUILT-UP ASPHALT ROOFING

06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This broadscope section covers asphalt and coal-tar built-up roofing systems and nonmetallic flashing systems.

Drawings must include details for all flashing systems, roof drains, roof-edge vents for roof insulation, and other construction features of the roofing system.

Metal flashing and pitch pans are specified in Section 07600, "Flashing and Sheetmetal."

Roof insulation is specified in Section 07220, "Roof and Deck Insulation."

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

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The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M	(2003) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) Standard Specification for General Requirements for Steel Sheet,

	Metallic-Coated by the Hot-Dip Process
ASTM D 1227	(1995; R 2000) Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
ASTM D 1863	(2003) Standard Specification for Mineral Aggregate Used on Built-Up Roofs
ASTM D 2178	(1997a) Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D 249	(1989) Standard Specification for Asphalt Roll Roofing (Organic Felt) Surfaced with Mineral Granules
ASTM D 312	(2000) Standard Specification for Asphalt Used in Roofing
ASTM D 371	(1989) Standard Specification for Asphalt Roll Roofing (Organic Felt) Surfaced with Mineral Granules; Wide Selvage
ASTM D 41	(1994; R 2000e1) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 4586	(2000) Standard Specification for Asphalt Roof Cement, Asbestos Free
ASTM D 517	(1998) Standard Specification for Asphalt Plank

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330, "Submittals," and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.
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The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Asphalt Primer
Base Sheets
Roofing Felts

Cap Sheets
Sheathing Paper
Bituminous Plastic Cement
Fasteners
Cants
Aggregate Surfacing
Roof Walkways
Adhesive
Asphalt Base Emulsion

SD-07 Certificates

Certificates for Adhesive shall show UL listing and flame resistance certification.

SD-11 Closeout Submittals

Warranty

PART 2 PRODUCTS

2.1 ADHESIVE FOR APPLICATION OF INSULATION

Adhesive for application of [insulation] [underlayment] to steel decks shall be nonflammable (except for foamglass) and shall meet the requirements of the Underwriters Laboratories, Inc., for a metal roof-deck construction assembly. Asphalt adhesive shall be applied full mop prior to installation of insulation.

2.2 ASPHALT-PRIMER

Asphalt primer shall conform to ASTM D 41.

Asphalt shall conform to ASTM D 312, Type [I] [II] [III] [IV].

2.3 BASE SHEETS

Base sheet shall be asphalt-impregnated glass-fiber felt conforming to ASTM D 2178.

2.4 ROOFING FELTS

Roofing felt shall be asphalt-impregnated glass fiber conforming to ASTM D 2178, Type IV.

2.5 CAP SHEETS

Cap sheet shall be asphalt roll roofing conforming to ASTM D 249.

Cap sheet shall be wide selvage asphalt roll roofing conforming to ASTM D 371, with a [17] [19] inch [430] [485] millimeter selvage.

2.6 SHEATHING PAPER

Sheathing paper shall be rosin-sized weighing not less than 5 pounds per 100 square feet 3 kilogram per 10 square meter or unsaturated felt weighing approximately 7-1/2 pounds per 100 square feet 3.7 kilogram per 10 square meter.

2.7 BITUMINOUS PLASTIC CEMENT

Bituminous plastic cement shall conform to ASTM D 4586, Type I for asphalt-saturated felts.

2.8 FASTENERS

Roofing nails shall be [nonferrous] [cement coated] [galvanized] with [_____] inch millimeter diameter heads (annular or spiral-threaded for plywood deck) of sufficient length for maximum penetration into the deck or wood nailer.

Insulation holddown clips, as recommended and approved by the insulation manufacturer, shall be used at the roof perimeter in addition to the asphalt adhesive.

2.9 CANTS

Cants shall be made from treated fiberboard and shall reduce the angle covered into two equal angles. Fiberboard shall be treated for moisture resistance by an integral treatment of wax or bituminous impregnation.

2.10 AGGREGATE SURFACING

[Gravel] [Slag] [Aggregate] shall conform to ASTM D 1863, size No. 7.

2.11 ROOF WALKWAYS

Asphalt planks shall be 36 by 72 inches by 1/2 inch 950 by 1830 millimeter by 15 millimeter thick, consisting of a homogeneous core of asphalt, plasticizers, and fillers bonded between two saturated and coated facing sheets. Top side shall be surfaced with ceramic granules. Planks shall conform to ASTM D 517, mineral-surfaced asphalt.

2.12 ASPHALT-BASE EMULSION

Asphalt-base emulsion shall conform to ASTM D 1227, Type [_____].

PART 3 EXECUTION

3.1 ROOFING SYSTEM

Contractor shall provide a roofing system with asphalt bitumen and [aggregate] [smooth surface] surfacing on a [concrete deck without insulation] [concrete deck with insulation] [lightweight concrete deck without insulation] [lightweight concrete deck with insulation] [precast-gypsum deck without insulation] [precast-gypsum deck with insulation] [cast-in-place gypsum deck without insulation] [cast-in-place gypsum deck with insulation] [wood deck without insulation] [wood deck with insulation] [metal deck with insulation].

3.2 SUMMARY OF MINIMUM MATERIAL WEIGHTS (PER 100 SQ FT 10 SQ METRE)

Asphalt assembly:

[Sheathing paper] [Base sheet]	[_____pounds]	[_____kg]
[Asphalt mopping] [Adhesive] to receive insulation	[_____pounds]	[_____kg]

Vapor retarder	[_____pounds]	[_____kg]
Roof insulation	[_____pounds]	[_____kg]
Asphalt mopping to receive base sheet	[_____pounds]	[_____kg]
Asphalt-saturated roofing felts ([_____] piles)	[_____pounds]	[_____kg]
Asphalt moppings between felts ([_____] at [_____] pounds) kg)	[_____pounds]	[_____kg]
Cap sheet	[_____pounds]	[_____kg]
Flood coat	[_____pounds]	[_____kg]
[Gravel] [Slag] [Aggregate] surfacing	[_____pounds]	[_____kg]
Approximate total weight	[_____pounds]	[_____kg]

3.3 PREPARATION

Contractor shall verify that work of other trades that penetrates the roof deck or requires men and equipment to traverse the roof deck is complete.

Contractor shall examine deck surfaces for inadequate anchorage, foreign material, moisture, and unevenness which would prevent the execution and quality of application.

Contractor shall proceed with the roofing application only after defects have been corrected.

Starting work designates acceptance of the surfaces by the Contractor.

3.4 APPLICATION

3.4.1 General

Roofing installation shall be continuous, with all operations proceeding together. Base sheet and specified plies of felt shall follow shingle-fashion as a single composite operation.

Roofing shall be applied only when the ambient temperature is above 50 degrees F 10 degrees C.

Interval between the base sheet application and succeeding plies shall not exceed 48 hours.

Before cessation of work on each working day or when work is interrupted due to rainfall or other causes, the roof shall be sealed against intrusion of water. Base sheet shall be brought to the edge of the insulation, dams shall be installed and exposed felts shall be effectively glazed. Insulation or unglazed felts shall not be left exposed during rainfall or overnight.

Traffic over partially or completely finished roofing shall be only on planks or on plywood not less than 5/8 inch 15 millimeter thick and 2-feet 600 millimeter wide.

Bitumen quantities specified for laminating insulation, attaching base sheets, laminating successive plies of felts, or flood coating shall be regarded as square-foot by square-foot square meter by square meter minimums, not as averages for areas.

Debris shall be removed from the roof at the end of each work day.

3.4.2 Heating Bitumens

Asphalt shall be heated and applied at its respective Equiviscous Temperature (EVT) plus or minus 25 degrees F 19 degrees C.

3.4.3 Built-Up Roofing Application

Roofing shall be installed in accordance with the approved roofing manufacturer's specification and the NRCA Roofing and Waterproofing Manual applicable specification.

10-SERIES for Temporary Roofs and Vapor Retarders

20-SERIES for Insulation Attachment

30-SERIES for Nailable Roof Decks

40-SERIES for Insulated Roof Decks

50-SERIES for Concrete Roof Decks

60-SERIES for Existing Built-up Roofing (BUR) Substrate

3.4.4 Vapor Retarder Application

Vapor retarders shall be installed in accordance with the approved roofing manufacturer's specification and the NRCA Roofing and Waterproofing Manual applicable specification.

3.4.5 Flashing Applications

Flashing shall be provided in the angles formed at walls and other vertical surfaces and where required to make the work watertight. Bituminous plastic cement shall be used for the application of flashing. Flashing shall be provided and installed immediately after the top ply of the roofing is placed and shall be returned and sealed or capped and sealed to waterproof edges and ends. Flashing shall be stepped where vertical surfaces abut sloped roof surfaces. Sheetmetal reglet up to which base flashing is installed shall be not more than 16 inches 400 millimeter nor less than 8 inches 200 millimeter above the roofing surfaces.

Flashing shall be installed in accordance with the NRCA Roofing and Waterproofing Manual applicable construction details.

3.4.6 Cant Strip Application

Cant strips shall be installed in the angles formed at wall and other vertical surfaces as backing for base flashings. Cant strips shall be laid in a solid coat of bituminous cement just prior to laying the roofing plies. Cants shall have a 5-1/2 inch 140 millimeter face dimension, shall be continuous, and shall be installed in as long lengths as practical.

3.4.7 Valley Application

Valleys: Roofing shall be applied at valleys and waterways in the following manner:

Base sheets shall continue across valleys and terminate 18 inches 450 millimeter from the valley.

Felt plies shall continue across valleys and terminate 12 inches 300 millimeter from the valley. Exposed laps shall terminate on a line 12 inches 300 millimeter from, and parallel to, the gutter valley. Two plies of felt, 9- and 12-inches 225 and 300 millimeter wide, shall be successively mopped in over each felt line of the termination.

If the application can be completed without wrinkles, buckles, or fishmouths and if side laps do not face the direction of drainage, roofing felts and base sheets may be laid continuously across or parallel to shallow valleys such as those formed by reverse-slope roofs. For this application, valleys shall be reinforced with one ply of felt, 36 inches 900 millimeter wide, centered on the valley gutter and laid in a solid mopping of asphalt over the top ply of roofing.

3.4.8 Mechanical Application

When mechanical roofing-application equipment is used, planks, plywood, or other approved protection shall be placed over the roof insulation or the roofing. Traffic shall be confined to the protected area. Felt machines shall contain a sufficient quantity of bitumen at the proper temperature to ensure no holidays in the bitumen.

3.4.9 Walkway Application

Asphalt plank walkway systems for the protection of the roofing membrane shall be installed.

A heavy coating of hot asphalt shall be applied over the designated walkway areas and directly on the felt membrane. While the asphalt is still hot, asphalt planks shall be laid. A 1/2 inch 13 millimeter space shall be allowed between adjacent boards for drainage.

3.4.10 Roof Vent Application

Where vapor retarders are required, roof vents shall be provided on the minimum basis of one roof vent for each 1,200 square feet 110 square meter of roof area, with no point on the roof more than 45 feet 13.5 meter from a point of venting. Roof vents shall be of 22-gage 0.85 millimeter galvanized steel conforming to ASTM A 924/A 924M and ASTM A 653/A 653M, G165 Coating Designation.

Roof vents shall be cylindrical, not less than 6 inches 150 millimeter in diameter and 8-inches 200 millimeter high. A conical weather cap, cone-base diameter 12 inches 300 millimeter and cone height 6 inches 150 millimeter, shall be securely fastened to the top of each roof vent by galvanized strap brackets. At roof end of the vent, a 12 inch 300 millimeter flashing flange shall be securely brazed to the vent cylinder approximately 3/8 inch 10 millimeter from the end.

Roof vents shall be installed before the flood coat is applied. Contractor

may, at his option, temporarily omit the flood coat and aggregate surfacing at the location of the roof vents. Such areas shall be not less than 30 inches 750 millimeter nor more than 48 inches 1200 millimeter in diameter *and shall be effectively glazed-in when the adjacent surfaces are floodcoated.

To install roof vents in roofs with mineral-fiberboard insulation, a circular hole shall be cut through the membrane and the top layer of insulation to but not through the bottom layer of insulation. Hole shall snugly accept the vent cylinder.

Vents in roofs with cellular-glass insulation shall be installed astride one of the joints in the insulation to give it access to the chamfered venting channels. Roof flanges of the vents shall be flush with the end of the vent. Cap sheet of the top layer of insulation shall be removed within the circular area of the vent cylinder.

Roof vent shall be set over the hole, with the flashing flange set in hot steep asphalt. One ply, 24 inches 600 millimeter square, shall be set in a hot mopping of asphalt at a 20-pound 9 kilogram per square rate, followed by a second ply, 30 inches 750 millimeter square, on top of the 24 inch 600 millimeter square, also set in a hot mopping of asphalt at a 20-pound 9 kilogram per square rate. Over the top ply the flood coat and aggregate surfacing shall be applied to match surrounding areas.

3.5 ACCEPTANCE

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NOTE: Following a minimum of 90 calendar days operation (or installation), but no later than one year, the Systems Engineer/Condition Monitoring Office/Predictive Testing Group should inspect the installation using advanced monitoring technologies such as Infrared Imaging or Ultrasonic mapping. These technologies can identify insulation voids, insulation settling, and areas of moisture intrusion. Identification of insulation materials and locations is required to effectively identify these types of problems. The Systems Engineer/Condition Monitoring Office/Predictive Testing Group needs to know the warranty expiration date, if there is a warranty, in order to perform the inspections within the prescribed time frame.

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Prior to final acceptance, the Contractor shall provide construction (as-built) details [and warranty information] to the Contracting Officer. Construction details shall include, by building area, the material type, amount, and installation method. An illustration or map of the building may serve this purpose. Data shall have a cover letter/sheet clearly marked with the system name, date, and the words "As built insulation/material." Forward as-built [and warranty] information to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database.

-- End of Section --